Lat 39.91071 Lon -120.17933

Forest Health Protection

Pacific Southwest Region
Northeastern California Shared Service Area

Date: February 3, 2015
File Code: 3420

To: District Ranger, Beckwourth Ranger District, Plumas National Forest

Subject: Evaluation of stand conditions at Frenchman Lake (FHP Report NE15-02)

Summary

At the request of Paul Czeszynski, Silviculturist, Beckwourth Ranger District, Danny Cluck, Forest Health Protection (FHP) Entomologist, and Bill Woodruff, FHP Plant Pathologist, conducted a field evaluation of the Frenchman Lake recreation area on October 8, 2014. The objective of this visit was to evaluate the current forest health conditions within the proposed project area, discuss what influence these conditions would have on stand management objectives and provide recommendations as appropriate. This area was also evaluated to determine if it qualified for FHP Western Bark Beetle Program funding. Paul Czeszynski accompanied us to the field.

Key findings:

- Overstocking is putting many stands at risk to elevated levels of bark beetle-caused tree mortality during periods of drought.
- Elevated bark beetle-caused tree mortality has been observed during recent drought periods; particularly 2009 – 2011.
- Thinning is recommended throughout the Frenchman Lake recreation area to increase the health and vigor of residual trees.
- This area meets the requirements for FHP Western Bark Beetle Funding and is supported by this evaluation.

Description of the project area

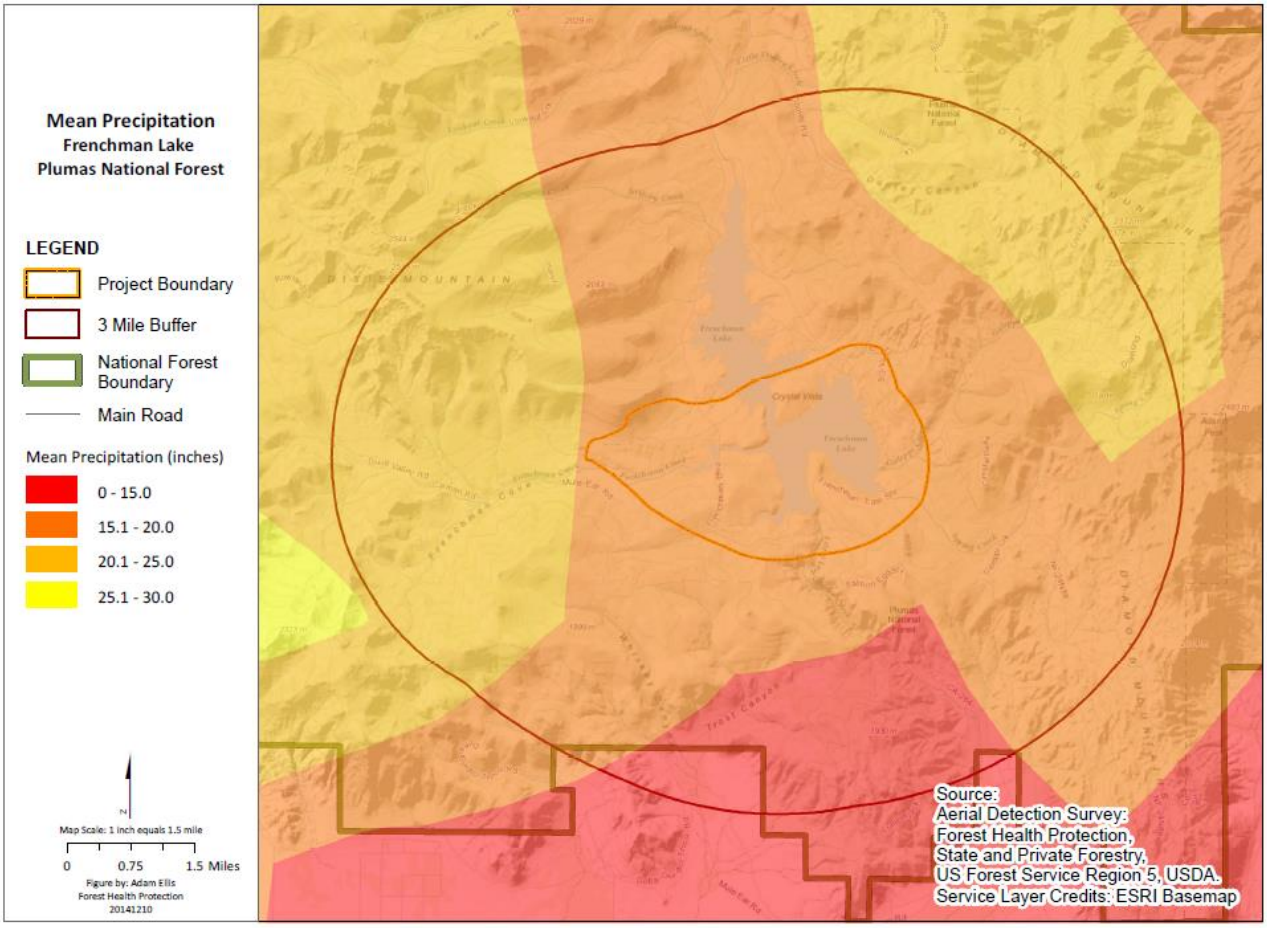
The Frenchman Lake recreation area is located approximately 6 miles northwest of the community of Chilcoot, CA (T24N, R16E). The elevation of the site ranges from 5,600 to 6,700 feet with annual precipitation ranging from 15 – 25 inches (Figure 1). Areas immediately adjacent to the reservoir are generally below 6,000 feet and receive less than 20 inches of annual precipitation. The forested areas around the reservoir are primarily eastside pine; mostly Jeffrey pine (*Pinus*

Danny Cluck
Forest Entomologist
530-252-6431
dcluck@fs.fed.us

Bill Woodruff
Plant Pathologist
530-252-6880
wwoodruff@fs.fed.us

jeffreyi) with lesser amounts of ponderosa pine (*Pinus ponderosa*). White fir (*Abies concolor*) is mixed with pines on higher north facing slopes and incense cedar (*Calocedrus decurrens*) is also present in a few stands. In addition to conifer species, a few small stands of quaking aspen (*Populus tremuloides*) are located around the south end of the lake.

Figure 1. Mean annual precipitation for Frenchman Lake and surrounding area.



Forest insect and disease conditions

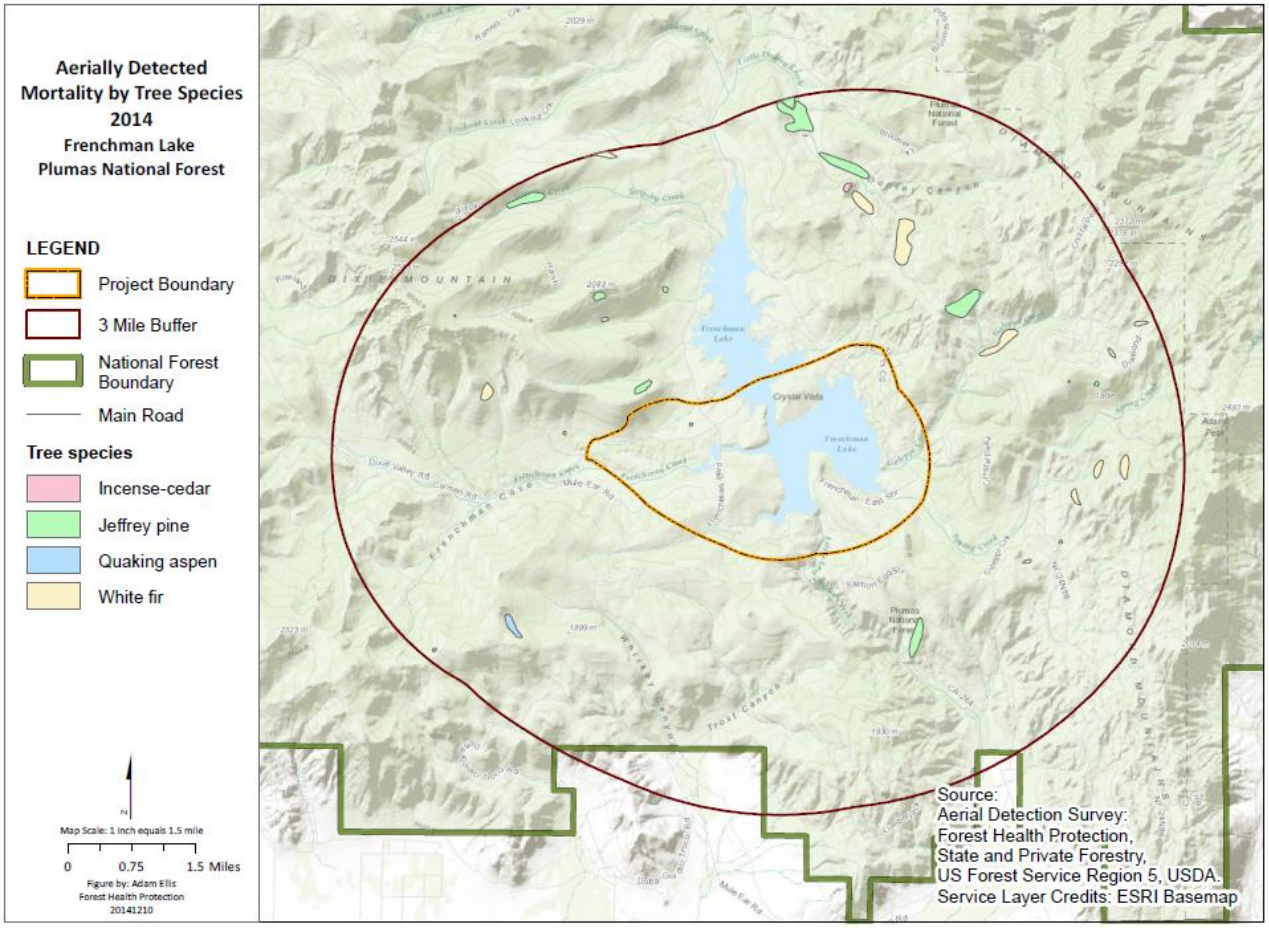
Agents/hosts observed from ground reconnaissance:

- Very light western dwarf mistletoe (*Arceuthobium campylopodum*) infections on Jeffrey pine near Big Cove Campground.

Agents/hosts detected from Aerial Detection Survey in 2014 (Figure 2):

- Aspen dieback (most likely caused by satin moth, *Leucoma salicis*, a common aspen agent in 2014).
- Fir engraver beetle (*Scolytus ventralis*)-caused mortality of white fir
- Jeffrey pine mortality attributed to California flatheaded borer (*Phaenops californica*).
- Incense cedar discoloration (most likely drought induced mortality)

Figure 2. 2014 aerially detected tree mortality in by species.



Stand conditions and mortality related to recent and future climate trends

Many of the forested areas in the Frenchman Lake area in an overstocked condition (Figures 3 & 4) and in drier years have exhibited an elevated level of tree mortality caused by bark beetles (and occasionally woodboring beetles) (Table 1 and Figure 6). This mortality combined with high stand density has resulted in heavy fuel loading in some areas and a corresponding increase in fire danger.

Figure 3. Dense Jeffrey pine stand in Spring Creek Campground.

Figure 4. Dense Jeffrey pine stand near Cottonwood Campground.

Jeffrey pine stands close to the lake have yet to experience significant mortality. One reason for this lack of mortality is that most of these trees are not large enough to be suitable hosts (< 8" dbh) or at least not large enough to be preferred hosts (< 14" dbh) for Jeffrey pine beetle (*Dendroctonus jeffreyi*). Jeffrey pine beetle also requires several years of drought to build populations to outbreak levels. While Jeffrey pine beetle outbreaks are infrequent, they can be extensive and cause very high levels of tree mortality such as occurred in the Lake Tahoe basin in the 1990's (Figure 5). Jeffrey pine stands next to Frenchman Lake will eventually grow into a more susceptible condition and could experience high levels of mortality during future droughts.

Figure 5. Jeffrey pine beetle outbreak near Lake Tahoe in 1995.

The majority of the project area's average annual precipitation of 15 - 25" puts most conifers at a higher risk of mortality during periods of drought (Figure 7). White fir growing in this area is at an

Figure 6. Areas of elevated tree mortality mapped by Aerial Detection Surveys (ADS) between 2000 and 2014.

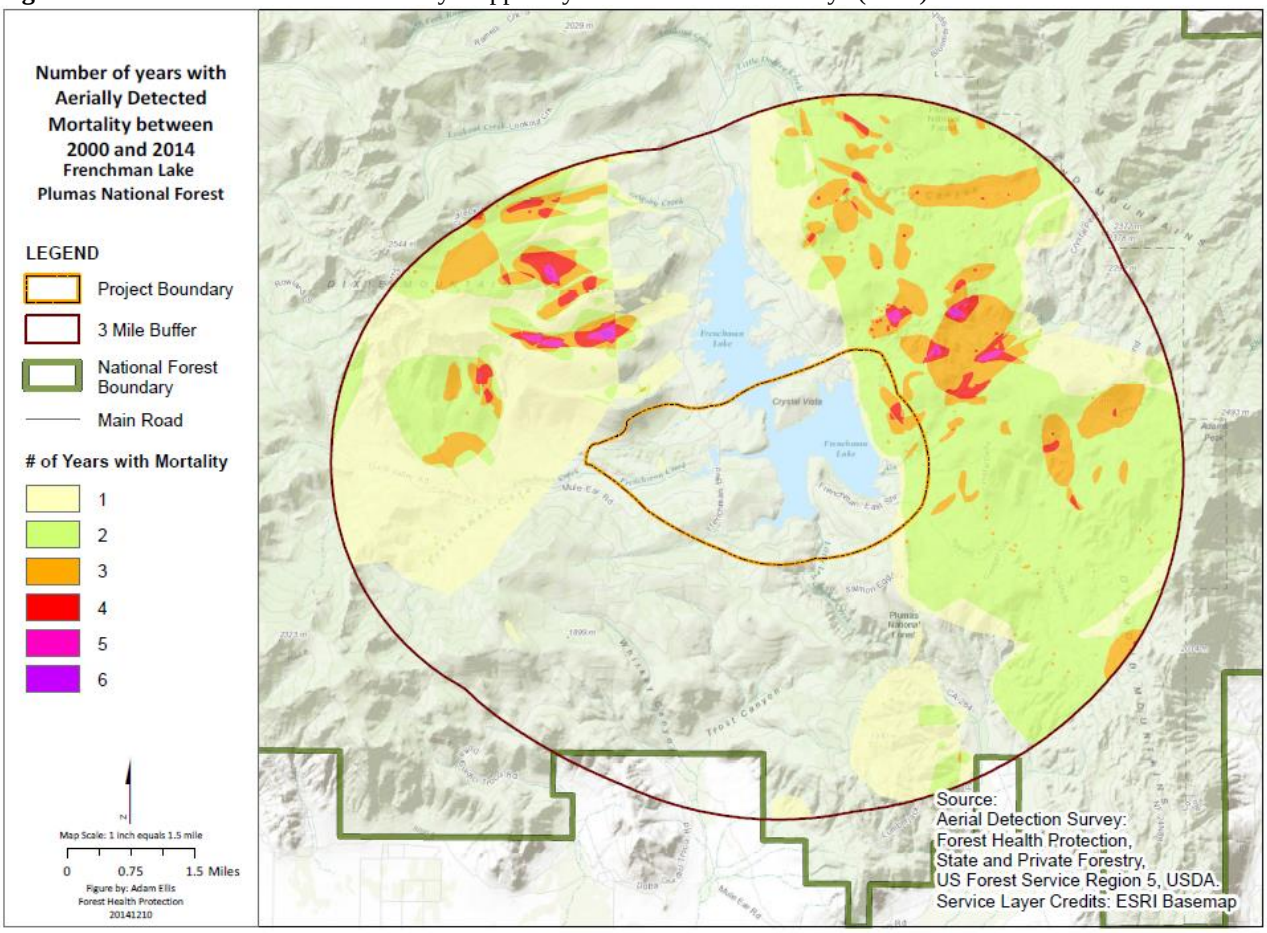


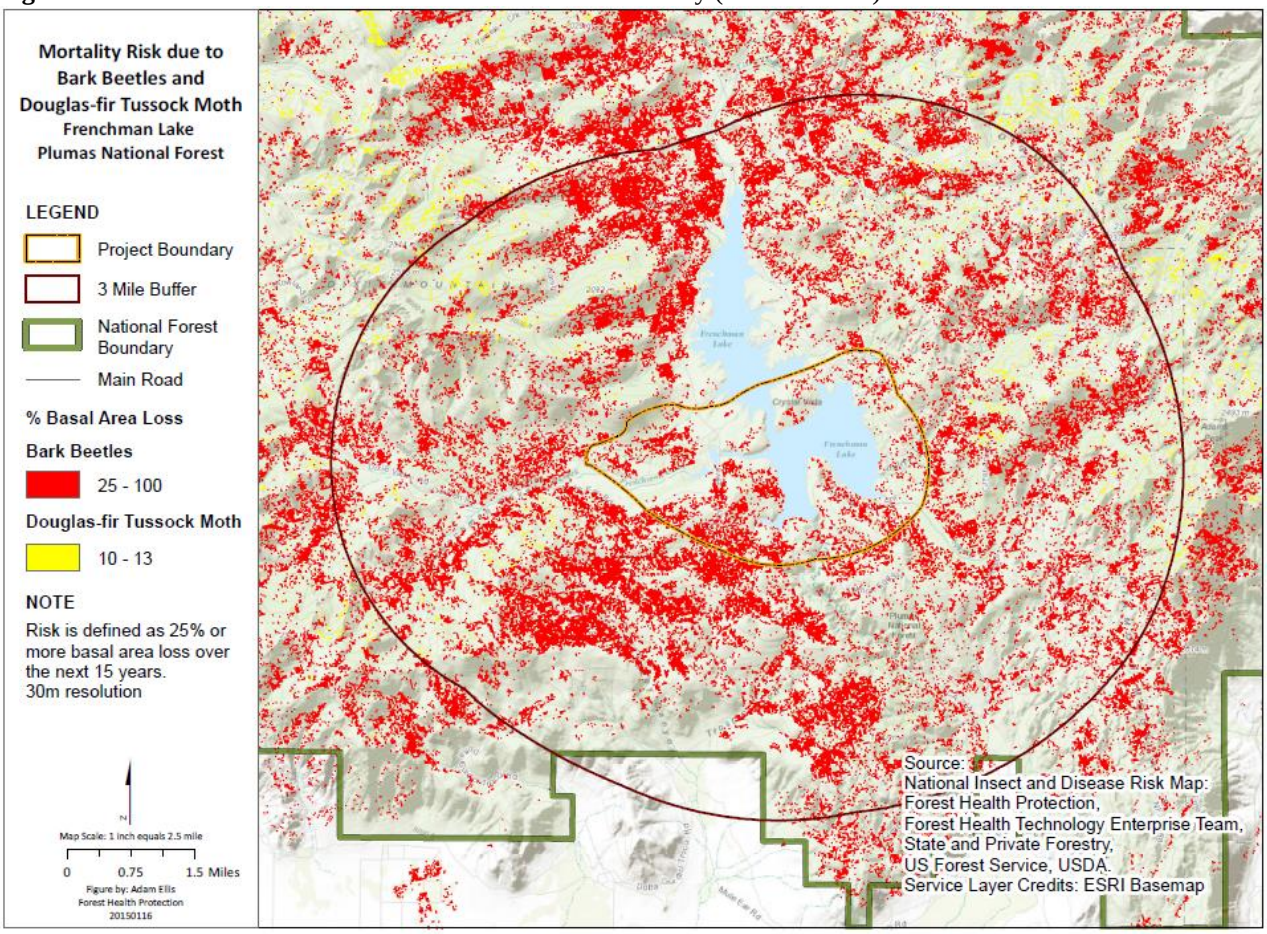
Table 1. Acres with mortality, estimated dead trees per acre and estimated total # of dead trees from R5 Aerial Detection Surveys and Palmer Hydrologic Drought Index (PHDI) (average of CA Divisions 2 and 3[1]) by water year (Oct-Sept) within and adjacent to the Frenchman Lake area.

Year	Acres	Dead Trees/Acre	Total # of Dead Trees	PHDI[2]
2014	400	2.3	909	-3.56
2013	10	0.7	7	-2.16
2012	567	2.1	1186	-0.59
2011	1222	1.4	1753	2.78
2010	486	11.0	5324	-0.14
2009	551	3.5	1956	-2.98
2008	404	2.2	881	-3.16
2007	396	0.6	222	-3.17
2006	261	3.5	902	2.40
2005	695	1.3	910	0.37

[1] California Divisions 2 and 3 encompass most of northeastern California. Frenchman Lake is on the border between these two zones.

[2] PHDI values ranging from -2.00 to -2.99 are considered moderate drought conditions. Severe drought conditions range from -3.00 to -3.99 and extreme drought conditions are below -4.00.

Figure 7. Areas considered at risk to bark beetle-caused mortality (NIDRM 2012)



extreme risk of mortality (D. Schultz 1994, FHP Report 94-2). Therefore, even with lower stocking levels, trees can still be vulnerable to moisture stress and subsequent bark and woodboring beetle attacks.

Predicted climate change is likely to impact trees growing in this area over the next 100 years. Although no Plumas National Forest specific climate change models are available at this time, there is a general consensus among California models that summers will be drier than they are currently. This prediction is based on the forecasted rise in mean minimum and maximum temperatures and remains consistent regardless of future levels of annual precipitation (K. Merriam and H. Safford, *A summary of current trends and probable future trends in climate and climate-driven processes in the Sierra Cascade Province, including the Plumas, Modoc, and Lassen National Forests*). Under this scenario, the risk of bark beetle-caused tree mortality will likely increase for all conifer species, especially drought intolerant white fir. Improving the resilience of stands to future disturbance events through density, size class and species composition management will be critical to maintaining a healthy forested landscape.

Considerations for thinning treatments

A variable thinning was discussed for stands in the Frenchman Lake area. Variable thinning in eastside pine stands should attempt to reduce basal area to approximately 80 – 120 sq.ft./acre while creating gaps and clumps. Campground treatments should strive for a mix of age/size classes and species where applicable such as maintaining a mix of ponderosa and Jeffrey pine where it currently exists. Higher residual basal areas closer to 120 sq.ft./acre could be retained where needed for shading within campgrounds. Where other resource objectives allow, thinning to basal areas below 80 sq.ft./acre may be desirable to free up more resources for residual trees and increase the longevity of treatments. Spatial heterogeneity should also be emphasized outside of campground areas to avoid large unshaded openings near campsites. This type of treatment should effectively reduce inter-tree competition for limited water and nutrients and reduce the risk of insect and disease-caused mortality for most stands. Untreated areas would remain at a higher risk of insect and disease caused mortality, especially during periods of drought.

When planning thinning treatments, it should be recognized that the target stand density is an average to be applied across the landscape and some variability may be desired. Individual high value trees, such as mature pines, should benefit by having the stocking around them reduced to lower levels. Allowing for denser tree spacing and pockets of higher canopy cover may be desirable around potential wildlife trees, such as forked and/or broken-topped trees. This type of ecological restoration approach would also be consistent with the Region 5 Ecological Restoration Strategic Priority.

When implementing thinning projects, retaining more drought tolerant species such as ponderosa pine, Jeffrey pine and incense cedar over white fir will increase species diversity and make stands more resilient to disturbance. In addition, when selecting trees for removal, preference should be given to trees heavily infected with dwarf mistletoe, root disease and trees infested with bark beetles.

It is recommended that a registered borate compound be applied to all freshly cut conifer stumps >14” in diameter to reduce the chance of creating new infection centers of *Heterobasidion irregulare* and *H. occidentale* (formerly referred to as P-type and S-type annosus root disease). All conifer stumps greater than 3” in diameter must be treated with a registered borate compound

(FSM R5 Supplement 2300-92-1 modified by FSH R5 Supplement 3409.11-2010-1) within areas such as campgrounds, day-use areas and other high-use areas such as parking lots and boat ramps.

Considerations for aspen enhancement

Conifers within and adjacent to aspen stands provide a seed source that, in the absence of fire, can lead to greater conifer abundance at the expense of aspen. Insect and disease agents on aspen in the Frenchman Lake area are impacting aspen health far less than the existing conifer encroachment. While it is important for the District to be aware of the potential for damage by pest agents, the impacts of conifer encroachment are of a more imminent concern. Once aspen stands are treated by removing conifers and protecting regeneration (if necessary), vigorous stands will be more resilient to the impacts of any native insect or disease.

Additional considerations for campgrounds

Trees within Frenchman Lake campgrounds, like most forested high-use recreation areas, are exposed to additional stress factors that can compromise their health and vigor. Firewood collecting sometimes leads to tree wounding from hatchets and saws. Carving and chopping trunks can cause extensive cambium damage. Foot and vehicle traffic compacts soil and can damage roots. Posting public information signs at campground entrances may help increase awareness of the human impact on campground trees.

Soil compaction can predispose conifers to bark beetle attacks and subsequent mortality. Compaction can reduce the water holding capacity of the soil and suffocate roots, which limits the available oxygen that is necessary for root growth and survival. Damaged and unhealthy roots cannot provide the upper portions of the tree with the water and nutrients it requires to maintain its natural defenses. Soil compaction and associated root injury are long-term problems that may not reveal themselves until several years after the damage has occurred. In order to minimize future soil compaction and root damage, campers should be directed to specific travel corridors from campsites to restrooms, water sources, and specific recreation areas. It is especially important to divert and limit foot and vehicle travel and keep excavation for roads, trails and utilities away from the root zones of trees.

Considerations for Rx fire

If prescribed fire is used as a follow-up treatment to stand thinning or as a standalone treatment, unacceptable levels of large diameter pine mortality may occur depending on management objectives. This mortality most often occurs as a direct result of cambium or crown injury to individual trees during the fire. Mature Jeffrey and ponderosa pines are susceptible to mortality during prescribed burns because of the deep duff and litter that has accumulated at their base in the absence of fire. These duff mounds typically burn at a slow rate, while maintaining lethal temperatures, causing severe cambium injury. To protect individual large diameter pine from lethal cambium injury, raking the duff away from the bases of these trees before burning (within 24” of the bole and down to mineral soil) is recommended.

Considerations for hazard trees

Despite the effectiveness of any long or short-term plans to prevent tree injury and mortality, some trees, through declining health, will eventually become hazards to the public. To minimize risk,

hazard trees should be identified and removed before they fail. The current practice for many National Forest campgrounds is to remove trees as they die. This eliminates the risk from dead trees but fails to address living trees that are infected with root disease, heart rot, and/or have a structural defect. These high-risk green trees are equally hazardous and should not be overlooked. Therefore, it is recommended that the District develop a hazard tree evaluation and monitoring plan for these recreation areas. Region 5 Forest Health Protection has recently developed hazard tree guidelines that can assist with this process (Angwin et al 2012). In the short-term, trees within the campgrounds, and within striking distance of a target, that have obvious stem decay, dead tops and/or large dead branches should be carefully evaluated and hazards removed or pruned as soon as possible. All standing dead trees within striking distance of any target should be removed immediately.

Potential for FHP Funding

Forest Health Protection may be able to assist with funding, including NEPA activities, for thinning and removing green material from overstocked areas within the Frenchman Lake area. Thinning treatments that reduce stand density sufficient to lower the risk to bark beetle-caused mortality would meet the minimum requirements for Western Bark Beetle Program funding and would be supported by this evaluation. If you are interested in this competitive funding please contact me for assistance in developing and submitting a proposal. Also, please note that any thinning project proposals you anticipate submitting to FHP for FY16 funding through the Western Bark Beetle program need to be included in your FY16 forest capability request.

If you have any questions regarding this report and/or need additional information please contact Danny Cluck at 530-252-6431.

/s/ Danny Cluck

Daniel R. Cluck
Entomologist
530 252-6431
dcluck@fs.fed.us

/s/ Bill Woodruff

William Woodruff
Plant Pathologist
530- 252-6680
wwoodruff@fs.fed.us

cc: Paul Czeszynski, District Silviculturist, Beckwourth RD
Ryan Tompkins, Forest Silviculturist, Plumas SO
Forest Health Protection, Regional Office

References:

Angwin, P.A., D.R. Cluck, P.J. Zambino, B.W. Oblinger and W.C. Woodruff. 2012. *Hazard Tree Guidelines For Forest Service Facilities and Roads in the Pacific Southwest Region*. US Forest Service, Forest Health Protection, Region 5, Vallejo, CA. Report # RO-12-01. 40 p. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5332560.pdf